the other two integuments; it forms, at its apex, a drop of sweet fluid which captures the pollen-grains carried by the wind or possibly by insects. The outermost very thick integument becomes fleshy and bright-coloured, and is attractive to herbivorous animals. In the division of the cells of the nucellus at an early stage there is no evident predestination of one, as there is in most Angiosperms, as the mother-cell of the embryo-sac. In *Gnetum Gnemon* and *neglectum* there are usually two, three, or even more embryo-sacs which appear equally capable of further development; while in *G. edule*, and allied forms, the author found only one. In the division of the contents of the embryo-sac no differentiation of a female apparatus takes place in any of the species examined; no corpuscles or special ovum-cells are formed, and no antipodals; but the protoplasm of the embryo-sac divides into a parietal layer of primordial cells, which appear to be altogether equivalent, and which represent so many ovum-cells capable of fertilization.

As the pollen-tube lengthens, its nucleus gives off a smaller vegetative nucleus, probably soon after the entrance of the tube into the tissue of the nucellus. The two nuclei remain very near one another; the vegetative nucleus or prothallium cell remains unchanged, while the generative nucleus increases greatly in size and divides into two. In *G. edule* the apex of the pollen-tube has now entered the apex of the embryo-sac; while in *G. neglectum* it appears to make a curve to avoid the apex of the sac, and becomes closely applied to its lower portion. After the pollen-tube has entered the embryo-sac its vegetative nucleus disappears, while each of the two generative nuclei surrounds itself with a membrane of protoplasm, and the nucleus of each of these generative cells divides into four or eight. The actual coalescence of the male and female nuclei was not observed; but a number of small nuclei were detected in the male generative cells, in addition to its four (or eight) comparatively large male nuclei, which the author regards as the nuclei of the primordial ovum-cells which have wandered into the male generative cells; and the coalescence must take place within the male generative cell. After the entrance of the pollen-tube, the parietal layer of protoplasm of the embryo-sac, in which the female primordial cells are imbedded, breaks up into an endosperm tissue.

The author regards *Gnetum* as representing a higher type of the order *Gnetaceæ* than the other genera, *Welwitschia* and *Ephedra*; the fact that no endosperm is formed before fertilization indicating an advance on other Gymnosperms. The presence of a large number of embryo-sacs, and the absence in them of antipodals, may indicate some analogy with *Casuarina*. The processes described above finally negative, in the opinion of the author, the theory that the antipodals are a survival of the female prothallium of Vascular Cryptogams; they appear, rather, to be a degenerate and functionless female sexual apparatus. According to this view, there are, in the embryo-sac of Angiosperms, two female sexual apparatuses of similar origin, the vegetative nuclei of which coalesce in each; but one of the two apparatuses is altogether abortive. Both the antipodals and the egg-apparatus or embryonic vesicles consist of an archegone reduced to a single cell.

A. W. B.

INTERNATIONAL CONGRESS OF EXPERIMENTAL PSYCHOLOGY.

THE second session of the above Congress will be held in London on Monday, August 1, 1892, and the three following days, under the presidency of Prof. H. Sidgwick. The Congress will assemble in the rooms of University College, Gower Street (kindly lent for the purpose), from 10 to 1 and from 2 to 4.30. The following papers have been arranged for:—

Dr. Alexander Bain	"The Respective Spheres and the Mutual Aids of Introspection and Experiment in Psychology."
Prof. M. Baldwin	"Suggestion and Will."
Prof. Beaunis	"Psychological Questioning" (Des questionnaires psychologiques).
Dr. Bérillon	"The Applications of Hypnotic Suggestion to Education."
Prof. Bernheim	"The Psychical Character of Hysterical Amblyopia."
M. Binet	"The Psychology of Insects."
Prof. Delbœuf	"The Appreciation of Time by Somnambulists."
Dr. Donaldson	"Laura Bridgman."
Dr. Van Eeden	"Principles of Psycho-Therapeutics."
Prof. Ebbinghaus	"Theory of Colour-perception."
Dr. Goldscheider	"Investigations into the Muscular Sense of the Blind."
Prof. Stanley-Hall	"Recent Researches in the Psychology of the Skin."
Prof. Henschen	"The Visual Centre in the Cortex of the Calcarine Fissure."
Prof. Heymans	"Inhibition of Presentations."
Prof. V. Horsley	"The Degree of Localization of Movements and Correlative Sensations."
Prof. Pierre Janet	"Loss of Volitional Power (l'aboulie)."
Prof. N. Lange	"A Law of Perception."
Prof. Liégeois	"The Female Poisoner of Aïn-Fezza."
Prof. Lehmann	"Experimental Inquiry into the relation of Respiration to Attention."
Dr. Lightner-Witmer	"The Direct and Associative Factors in Judgments of Æsthetic Proportion."
Prof. Lombroso	"The Sensibility of Women, Normal, Insane, and Criminal."
Dr. Mendelssohn	"Investigations into the Parallel Law of Fechner."
Prof. Lloyd Morgan	"The Limits of Animal Intelligence."
Prof. G. E. Müller	"The Experimental Investigation of Memory."
Prof. Münsterberg	"The Psycho-Physical Basis of the Feelings."
Mr. F. W. H. Myers	"The Experimental Induction of Hallucinations."
Dr. W. R. Newbold	"The Characteristics and Conditions of the Simplest Forms of Belief."
Prof. Preyer	"The Origin of Numbers."
Prof. Ribot	"General Ideas."
Prof. Richet	"The Future of Psychology."
Prof. Schäfer	"The Anatomical and Physiological Relations of the Frontal Lobes."
Mrs. Sidgwick	"Experiments in Thought-Transference."
Dr. E. B. Titchener	"Binocular After-images."
Prof. Tschisch	"Relation of Reaction-time to the Breadth of Perception."
Dr. Verriest	"The Physiological Basis of Rhythmic Speech."
Dr. Waller	"On the Functional Attributes of the Cerebral Cortex."

The Meetings of the Congress will be General and Sectional. It is provisionally arranged that the General Meetings will be held on Monday or Thursday, and on the afternoons of Tuesday and Wednesday; and that the Sectional Meetings will be held on Tuesday and Wednesday Mornings, and if necessary on Thursday Morning. There will be two Sections at least: Section A, Neurology and Psychophysics; and Section B, Hypnotism and Cognate Questions. Under Section A will fall, for example, the papers of M. Binet, Profs. Henschen, Horsley, Schäfer, Waller, &c.; under Section B will fall the papers of Dr. Bérillon, Profs. Bernheim, Delbœuf, Liégecis, Dr. Van Eeden, Mr. F. W. H. Myers, and Mrs. Sidgwick.

Reports will be given in by Profs. Sidgwick and James and M. Marillier of the results of the census of hallucinations which it was decided to carry out at the first Session of the Congress (Paris, 1889).

A Committee of Reception has been formed, which includes, among others, the following names:—Dr. A. Bain, Dr. D. Ferrier, Mr. F. Galton, Dr. Shadworth Hodgson, Prof. V. Horsley, Dr. Hughlings Jackson, Dr. Charles Mercier, Prof. Croom Robertson, Dr. G. J. Romanes, Mr. Herbert Spencer, Mr. G. F. Stout, Dr. J. Ward, and Dr. de Watteville.

The fee for attendance at the Congress is ten shillings, which

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will entitle to a printed report of the proceedings. Any intending members who have not yet paid the fee are requested to send it to Prof. Sully.

During the Congress letters may be addressed to Members at the Council Room, University College, Gower Street, London, W.C., where each Member is requested to inscribe his name, on his first attendance at the Congress.

F. W. H. MYERS,
Leckhampton House, Cambridge.
JAMES SULLY,
East Heath Road, Hampstead, London, N.W.

SCIENTIFIC SERIALS.

THE current number of the *Royal Agricultural Society's Journal* is, perhaps, of more than usual interest. The first article is on Vermin of the Farm, by J. E. Harting, and is followed by an editorial note on the same subject. The plague of "mice" on the hill pastures of Scotland this spring gives a special interest to these articles. It appears that the Scotch plague is caused not by mice, but by fieldvoles (*Arvicola agrestis*), and the destruction they have wrought in the hill pastures of Scotland arises from the fondness of these voles for the delicate white stems of the hillside herbage. Judging from the reports of similar plagues in previous years it would appear that the natural enemies of the vole—the short-eared owl and the kestrel hawk—are far more efficacious remedies than any artificial means yet devised for the destruction of the voles; hence a paper on Wild Birds in relation to Agriculture, by Earl Cathcart, is very opportune, protesting as it does against the careless destruction of such birds as the owl, the hawk, and the rook. The Journal also contains a second paper by Mr. Dan Pidgeon on the Evolution of Agricultural Implements. A suggestive paper by Mr. William E. Bear on Desirable Agricultural Experiments advocates extensive experiments to test the economy of nitrogenous manuring by means of leguminous crops. Other papers in this number are Contagious Footrot in Sheep, by Prof. G. T. Brown; Variations of the Four-course System, by Gilbert Murray; and the Trial of Ploughs at Warwick, by F. S. Courtenay.

SOCIETIES AND ACADEMIES.

Oxford University Junior Scientific Club, May 27.—The biennial conversazione of the Club was held in the University Museum, when an address inaugural to the recently founded "Robert Boyle lectures of the O.U.J.S.C." was delivered by Prof. Sir Henry W. Acland, Bart., K.C.B., F.R.S., on Robert Boyle, his life, work, and influence on science. A very interesting series of exhibits was shown by the various departments of the Museum and by the University Observatory, illustrating recent progress in their particular branches of science. Of special interest were the exhibits by the Rev. F. J. Smith on shadow and objective spark photography, illustrated by pictures of objects in rapid motion; by Mr. Cecil Carus-Wilson, of natural and artificial musical sands; by the University Observers, of a series of splendid photographs illustrating recent improvements in astronomical and spectral photography; by the National Telephone Company, of telephonic apparatus; by Dr. Hunt, of preparations and cultivations illustrating the methods of isolation and identification of bacteria; by Mr. B. V. Darbishire, of a series of lantern views in the Caucasus and in the British East Africa Company's territory, the slides for which were kindly lent by the Royal Geographical Society. The Club is much indebted to the Royal Society, the Pharmaceutical Society, the Right Hon. the Earl of Cork and Orrery, Prof. Wyndham R. Dunstan, Prof. Odling, and other gentlemen for the loan of oil paintings, engravings, and relics of Robert Boyle and his contemporary men of science in Oxford.

June 3.—The President, Mr. W. Ramsden, in the chair.—The following papers were read:—The sub-salts of the alkali metals, by Mr. W. Pullinger.—The action of silicon-tetrachloride on benzene, by Mr. C. H. H. Walker.—Marriages of consanguinity, by Mr. H. Anglin Whitelocke.—A new and improved form of rotatory hypsometer, by Mr. S. A. Sworn (Balliol). Mr. C. J. Romanes was elected an honorary member of the Club.

June 14.—The President, Mr. W. Ramsden, in the chair.—The following papers were read:—The action of iodine on a mixture of sulphites and thiosulphates, by Mr. H. A. Colefax.—On marine nests, by Mr. W. B. Benham.

EDINBURGH.

Royal Society, June 20.—Dr. Traquair exhibited some remains of animals occurring in volcanic tuff at Teneriffe.—Dr. Hunter Stewart read a paper on the variations in the amount of carbonic acid gas in the ground air.—Dr. Buchan discussed the diurnal variations of barometric readings in the polar regions during summer. From observations made in the summer of 1876 and the two succeeding summers, in the central part of the North Atlantic, between 62° and 80° north latitude, he showed that only one maximum and one minimum occur during the day. Observations made by the *Challenger* staff in high antarctic latitudes during summer give the same result. A single maximum and a single minimum are also found in the interior parts of the polar continents, but these occur at different times of the day from the ocean maximum and minimum. Superposition of the two sets of variations gives a variation like that ordinarily observed.

July 4.—The Hon. Lord Maclaren, Vice-President, in the chair.—Dr. A. W. Hughes read a paper on the rotatory movements of the human vertebral column. Among other results he points out that while the lumbar vertebræ cannot rotate much about a vertical axis, the dorsal vertebræ are capable of considerable rotation—the total rotation of this part of the vertebral column being 45° or more—and the cervical vertebræ are still more free—the total amount being at least 90°.—Mr. R. Kidston discussed the genus *Lepidophloios*, Sternb.—Prof. C. G. Knott and Mr. A. Shand communicated some further notes on the volume effects of magnetization. Five iron tubes, with bores varying from 16·0 to 3·5 mm. diameter, but otherwise identical in form and substance, were subjected to a series of magnetizing forces. In low fields the thinner-walled tubes experienced the greater dilatations of internal volume; but in high fields the narrower bored tubes showed much the greater dilatations. For example, in field 1400 the dilatations of the tubes in order, beginning with the one of widest bore and thinnest wall, were $+4$, -3, -20, -53, and -129—each being multiplied by 10^{-7}. With the two tubes of widest bore, the change of volume had reached its limit at this high field, the substance being practically saturated; but with the tubes of narrowest bore there was no evidence of a limit being reached, the innermost layers of iron being evidently far from practical saturation. Some interesting illustrations of magnetic after-effect were also described.—Dr. A. B. Griffiths submitted a paper on the blood of the invertebrata.—Prof. Tait communicated the second part of a paper on the laws of motion. If we assume the principles of inertia of matter and conservation of energy (the energy of a self-contained system consisting of the kinetic energy of all its parts supposed to be moving with the speed of its centre of inertia, the kinetic energy of relative motion of its parts, and the potential energy of its parts), the fact that we cannot attach any definite meaning to the principle of conservation, except when the motion of the system is Galilei-wise, leads at once to the first and third laws of motion, since the centre of inertia moves uniformly in a straight line; and the second law becomes merely a definition of the word "force" as used in the first law, and as used instead of "action" and "reaction" in one interpretation of the third.

PARIS.

Academy of Sciences, July 4.—M. d'Abbadie in the chair.—On local disturbances produced underneath a heavy load uniformly distributed along a straight line normal to the two edges, on the upper surface of a rectangular beam: experimental verifications, by M. J. Boussinesq.—Resemblances in the march of evolution on the old continent and the new, by M. Albert Gaudry.—Experimental researches on falling bodies and the resistance of air to their motion: experiments performed at the Eiffel Tower, by MM. L. Cailletet and E. Colardeau. Metallic spheres were let fall from the second platform of the Eiffel

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